Abomasal nematodes of sheep and goats slaughtered in Awassa (Ethiopia): species composition, prevalence and vulvar morphology

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Summary

A study was carried out to determine the prevalence of abomasal nematodes of sheep and goats slaughtered in Awassa town from January 2006 through June 2006 with special emphasis given to *Haemonchus* spp. and to characterize vulvar morphs of female *Haemonchus* worms. During the study period 180 abomasas of sheep and 132 abomasas of goats were examined. Three genera of nematodes were identified in both sheep and goats abomasas with overall prevalence of 91.1 % and 87.1 % respectively. The specific prevalence rates observed were 81.1 % for *Haemonchus* spp., 47.2 % for *Trichostrongylus axei*, and 19.4 % for *Teladorsagia* spp. in sheep and 76.5 % for *Haemonchus* spp., 39.4 % for *T. axei* and 20.5 % for *Teladorsagia* spp. in goats. Out of 653 female *Haemonchus* recovered from sheep, 37.8 % had a linguiform vulvar flap, 30 % knobbed and 35.4 % smooth vulvar morphs. Out of 448 female *Haemonchus* recovered from goats, 43.8 % had linguiform vulvar flaps, 27.2 % knobbed and 29 % smooth morph type. A total of 239 linguiform female *Haemonchus* from sheep were further classified in to 15.1 % linguiform A (LA), 17.5 % linguiform B (LB), 39.7 % linguiform C (LC) and 27.6 % linguiform I (LI) and similarly from goats 196 linguiform female *Haemonchus* were further classified into 11.2 % LA, 12.2 % LB, 44.9 % LC and 31.6 % LI. Similar findings were observed in both host species regarding the worm burden, prevalence of infection and morphological pattern of *Haemonchus* species. Generally a high infection rate with abomasal nematodes was observed in both sheep and goats of the study area.

Key words: abomasal nematodes; Awassa; *Haemonchus*; *Teladorsagia*; *Trichostrongylus axei*; prevalence; vulvar flap

Introduction

Ethiopia, with its great variation in climate and topography, possesses one of the largest small ruminant populations in Africa. The latest estimate of small ruminant population gives 23.6 million sheep and 23.3 million goats (CSA, 2004). Small ruminants play a significant role in maintaining household stability by providing meat, milk, skin and wool, generate cash income and play traditional social and religious roles (Devendra & McLery, 1982; El-Azazy, 1995). Studies have revealed that ruminants contribute 80 % of the total food production from livestock in tropical Africa, of which small ruminants account for about 22 %.

However, in spite of the presence of huge numbers of small ruminant populations, Ethiopia fails optimally to exploit these resources. This is due to a multitude of constraining factors like ill health (Bekele et al., 1982; Teklye et al., 1987). Health disorders in all classes of small ruminants represent the major problems and greatly affect the economics of sheep and goat production. Gastrointestinal helminthosis is among the main constraints to small ruminant productions in Ethiopia. These parasites pose subtle economic losses and are the major factors responsible for lowered levels of production in many parts of the country. Abomasal nematodes and liver flukes are believed to be the most prevalent and widely distributed helminths (Barger, 1982).

Even though the losses incurred by these parasites are believed to be significant, accurate and up-to-date estimates of the economic impacts are lacking in Ethiopia. Available information revealed that infection due to abomasal nematodes especially *H. contortus* is responsible for important morbidities and mortalities in sheep and goats in different parts of the country (Bekele et al., 1982; Teklye et al., 1987). Mulugeta et al. (1989) reported yearly losses amounting to USD 82 million due to endoparasites in Ethiopia. Krecek and Waller (2006) reported that *H. contortus* alone is responsible for annual loss ranging from...
USD 26 million to 45 million in Kenya and South Africa. Studies conducted on gastrointestinal helminthosis of small ruminants (Abebe & Esayas, 2001; Bekele et al., 1982; Donald, 1999) indicated the importance of nematodes as a cause of impaired productivity. However, nationwide studies have never been carried out to determine the distribution of abomasal nematodes. Most previous studies in Ethiopia were based on coprological examinations, which are less sensitive in identifying the nematode species. We conducted this study to identify the species and determine the prevalence of abomasal nematodes of sheep and goats in and around Awassa town.

**Materials and Methods**

**Study area**

The study was conducted in Awassa town, the capital of Sidama zone, which is located in the northern part of Southern Nations, Nationalities and People’s Region (SNN PR) 275 km south of Addis Ababa, capital of Ethiopia. Geographically the area lies between 4° 27’ and 80° 30’ N latitude and 34° 21’ and 39° 11’ E longitude (Fig. 1). During the study period, Awassa received an annual average rainfall ranging from 801 to 1000 mm and with a mean temperature of the area of 20.1 – 25°C with an average altitude of 1790 m above sea level. The area is mainly covered by dry savanna and bush types of vegetation.

**Study animals and design**

The study was conducted on sheep and goats slaughtered in different restaurants in Awassa town. Most of the study animals were originated from Awassa and different areas of Sidama zone. As most of these animals were obtained from different markets it is difficult to trace the exact locality of their origin. Regular visits to restaurants in Awassa town allowed collections of abomasum of sheep and goats for the study. As soon as possible, after removal of the alimentary tract from the body cavity, the abomasum ligated at both ends were cut and transported to the parasitology laboratory of Animal Science Department of Awassa College of Agriculture for microscopic examination.

**Worm recovery, identification and count**

Worm recovery, species identification and determination of worm burden were carried out according to standard procedures described by Hansen and Perry (1994) and MAFF (1977). The abomasum were ligated at both ends and removed from omasum and duodenum. Then they were opened along the greater curvature and their contents were thoroughly washed in to a graduated bucket under a slow jet of water (the approximate volume of the abomasal content was 0.75 l). The mucus membrane was carefully rubbed with fingers to remove any worms adhering to it. The contents and washings were made to a total volume of two liters. Then it was vigorously stirred until all the abomasal contents, mucous and water were thoroughly mixed. A total of 200 ml of the contents was then transferred to measuring cylinder in five steps of 40 ml per step while stirring the mixture. A sub-sample of 20 ml was transferred to a small graduated beaker to which 2 – 3 ml iodine was added to stain the worm and 2 – 3 ml sodium thiosulfate solution was also added to decolorize debris. Finally about 3 – 4 ml of the sample was placed in a Petri dish having parallel lines marked at 5 mm apart, diluted with water and examined under a stereomicroscope. Samples were examined for the presence of nematodes, which were identified and counted as male or female. The total number of worms counted in the 20 ml sub-sample was then multiplied by 100 to get the total number of worms present in the abomasum.

**Vulvar morphology of Haemonchus species**

A representative number of female worms collected from each host species were classified according to their vulvar morphology under a stereomicroscope as follows: Linguiform females (with a supra vulvar flap), knobbed females (with knob like vulvar process) and smooth females (with out any vulval process). Identification was performed according to the criteria set by Rose (1966) and Jacquest et al. (1995).

Each linguiform female *Haemonchus* worms were further classified in to sub linguiform types (A, B, C & I) as has been described by Le Jamber and Whitlock (1968). Linguiform A has one cuticular inflation, Linguiform B has no cuticular inflations, Linguiform C has two cuticular inflations while in Linguiform I, the cuticular inflation arises from the linguiform process.

**Statistical analysis**

Descriptive statistics were used to summarize the data. In addition, Microsoft Excel software was used to store the data.